

WHAT IS CLAIMED IS:

1. Imaging apparatus to form an optical image depending on a video signal by irradiating the display elements with the light beam from a lighting optical system,

5 said lighting optical system comprising an array lens in which the lens to condense the light beam from a light source unit to form a plurality of light source images is used and any one of the diagonal size, vertical size, lateral size of lens cell is almost $1/(4.5 \text{ or more})$ for each corresponding size of
10 said display elements.

2. Imaging apparatus to form an optical image depending on a video signal by irradiating the display elements with the light beam from a lighting optical system,

 said lighting optical system comprising an array lens in
15 which a lens to condense the light beam from a light source unit to form a plurality of light source images is used and the diagonal size of lens cell is set to almost 0.18 inch or less.

3. Imaging apparatus according to claim 2, wherein said light source unit includes an electrode wire having the thickness of
20 0.6 mm or less in the single side of lamp electrode.

4. Imaging apparatus to form an optical image depending on a video signal by irradiating the display elements with the light from the lighting optical system,

 said lighting optical system comprising a lens array in
25 which a lens to condense the light from the light source unit

to form a plurality of light source images and the total number of lens cells is set to almost 240 or more.

5. Imaging apparatus according to claim 4, wherein said light source unit includes an electrode wire having the thickness of
5 0.6 mm or less in the single side of lamp electrode.

6. Imaging apparatus to form an optical image depending on a video signal by irradiating the display elements with the light from the lighting optical system,

10 said lighting optical system comprising an array lens in which a lens to condense the light from the light source unit to form a plurality of light source images and lens focal distance of lens cell is set to almost 30 mm or less.

7. Imaging apparatus to form an optical image depending on a video signal by irradiating the display elements with the light
15 from the lighting optical system,

said lighting optical system comprising an array lens having the structure that a lens to condense the light from the light source unit to form a plurality of light source images is used and any one of diagonal size, vertical size, lateral
20 size of lens cell is set almost to $1/(4.5 \text{ or more})$ for each corresponding size of said display elements and a processing section for isolating the light from said light source unit or array lens to the P-polarized light beam and S-polarized light beam with an isolating means and then changing the polarizing
25 direction of any one of said both P- and S-polarized light beams

with a converting means, whereby the center axis of arrangement of said isolating means is matched with the pitch in any one of vertical and lateral arrangement directions of the lens optical axis of at least said array lens.

5 8. Imaging apparatus to form an optical image depending on a video signal by irradiating the display elements with light from the lighting optical system,

said lighting optical system comprising an array lens having the structure that a lens to condense the light from the light source unit to form a plurality of light source images is used and the diagonal size of lens cell is set to almost 0.18 inch or less and a processing section for isolating the light beam from said light source unit or said array lens to the P-polarized light beam and S-polarized light beam with an isolating means and converting the polarizing direction of any one of both polarized light beams with a converting means, whereby the center axis of arrangement of said isolating means is matched with the pitch of any direction of the vertical and lateral arrangement directions of the lens optical axis of at least said array lens.

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9. Imaging apparatus to form an optical image depending on a video signal by irradiating the display elements with the light from the lighting optical system,

said lighting optical system comprising an array lens having the structure that a lens to condense the light from the

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light source unit to form a plurality of light source images is used and the total number of lens cells is set to almost 240 or more and a processing section for isolating the light from said light source unit or said array lens to the P-polarized light beam and S-polarized light source with an isolating means and converting the polarizing direction of any one of said both polarized light beams with a converting means, whereby the center axis of arrangement of said isolating means is matched with the pitch in any direction of the vertical and lateral arrangement directions of lens optical axis of at least said array lens.

10. Imaging apparatus to form an optical image depending on a video signal by irradiating the display elements with the light from the lighting optical system,

said lighting optical system comprising an array lens having the structure that a lens to condense the light from the light source unit to form a plurality of light source images is used and a lens focal distance of lens cell is set to almost 30 mm or less and a processing section for isolating the light from said light source unit or said array lens to the P-polarized light beam and S-polarized light beam with an isolating means and converting the polarizing direction of any one of both polarized light beams with a converting means, whereby the center axis of arrangement of said isolating means is matched with the pitch in any arrangement direction of the vertical and

lateral directions of lens optical axis of at least said array lens.

11. Imaging apparatus to form an optical image depending on a video signal by irradiating the display elements with the light from the lighting optical system,

said lighting optical system comprising an array lens having the structure that a lens to condense the light from the light source unit to form a plurality of light source images is used and any one of diagonal size, vertical size, lateral size of lens cell is set to almost $1/(4.5 \text{ or more})$ for each corresponding size of said display elements, an isolating section for isolating the light from said light source unit or array lens to the P-polarized light beam and S-polarized light beam, a light shielding section located in the light incident side rather than said isolating section to eliminate unwanted light beam and a converting section for converting the polarizing direction of any one of the P-polarized light beam and S-polarized light beam of the light emitted from said isolating section, whereby the center axis of arrangement of said isolating section is matched with the pitch in any arrangement direction of vertical and lateral directions of lens optical axis of at least said array lens.

12. Imaging apparatus to form an optical image depending on a video signal by irradiating the display elements with the light from the lighting optical system,

said lighting optical system comprising an array lens having the structure that a lens to condense the light from the light source unit to form a plurality of light source images is used and the diagonal size of lens cell is set to almost 0.18 inch or less, an isolating section for isolating the light from said light source unit or array lens to the P-polarized light beam and S-polarized light beam, a light shielding section located in the light incident side rather than said isolating section to eliminate unwanted light beam and a converting section for converting the polarizing direction of any one of the P-polarized light beam and S-polarized light beam of the light emitted from said isolating section, whereby the center axis of arrangement of said isolating section is matched with the pitch in any arrangement direction of the vertical and lateral directions of the lens optical axis of at least said array lens.

13. Imaging apparatus to form an optical image depending on a video signal by irradiating the display elements with the light from the lighting optical system,

said lighting optical system comprising an array lens having the structure that a lens to condense the light from the light source unit to form a plurality of light source images is used and the total number of lens cells is set to almost 240 or more, an isolating section for isolating the light from said light source unit or array lens to the P-polarized light beam

and S-polarized light beam, an light shielding section located at the light incident side rather than said isolating section to eliminate unwanted light beam and a converting section for converting the polarizing direction of any one of the P-

5 polarized light beam and S-polarized light beam of the light emitted from said isolating section, whereby the center axis of the arrangement of said isolating section is matched with the pitch in any arrangement direction of vertical and lateral directions of the lens optical axis of at least said array lens.

10 14. Imaging apparatus to form an optical image depending on a video signal by irradiating the display elements with the light from the lighting optical system,

said lighting optical system comprising an array lens having the structure that a lens to condense the light from the light source unit to form a plurality of optical source images is used and a lens focal distance of lens cell is set to almost 15 30 mm or less, an isolating section for isolating the light from said light source unit or array lens to the P-polarized light beam and S-polarized light beam, a light shielding section 20 located in the light incident side rather than said isolating section to remove unwanted light beam and a converting section for converting the polarizing direction of any one of the P-polarized light beam and S-polarized light beam of the light emitted from said isolating section, whereby the center axis 25 of arrangement of said isolating section is matched with the

pitch in any arrangement direction of the vertical and lateral directions of the lens optical axis of at least said array lens.

15. Imaging apparatus to form an optical image depending on a video signal by irradiating the display elements with the light
5 from the lighting optical system,

said lighting optical system comprising an array lens having the structure that a first array lens to condense the light from the light source unit to form a plurality of secondary order light source images and a second array lens to focus a
10 lens image of said first array lens to said display elements are used and at least any one of the diagonal size, vertical size and lateral size of any one or both lens cells of said first and second array lenses is set to almost $1/(4.5 \text{ or more})$ for each corresponding size of said display elements, an isolating
15 section for isolating the light from said light source unit or array lens to the P-polarized light beam and S-polarized light beam and a converting section for converting the polarizing direction of any one of the P-polarized light beam and S-polarized light beam of the light emitted from said isolating
20 section, whereby at least said first, second array lenses, said isolating section and said converting section are arranged in the manner that respective optical axes thereof are almost matched with a line.

16. Imaging apparatus according to claim 15, wherein said
25 isolating section is a polarized beam splitter and said

converting section is a $\lambda/2$ phase difference plate.

17. Imaging apparatus to form an optical image depending on a video signal by irradiating the display elements with the light from the lighting optical system,

5 said lighting optical system comprising an array lens having the structure that a first array lens to condense the light from the light source unit to form a plurality of secondary order light source images and a second array lens to focus a lens image of said first array lens to said display elements
10 are used and the diagonal size of the lens cell of any one or both first and second array lenses is set to almost 0.18 inch or less, a isolating section for isolating the light from said light source unit or array lens to the P-polarized light beam and S-polarized light beam and a converting section for
15 converting the polarizing direction of any P-polarized light beam and S-polarized light beam of the light emitted from said isolating section, whereby at least said first and second array lenses, said isolating section and said converting section are arranged in the manner that the respective optical axes thereof
20 are almost matched with a line.

18. Imaging apparatus according to claim 17, wherein said isolating section is a polarized beam splitter and said converting section is a $\lambda/2$ phase difference plate.

19. Imaging apparatus to form an optical image depending on
25 a video signal by irradiating the display elements with the light

from the lighting optical system,

said lighting optical system comprising an array lens having the structure that a first array lens to condense the light from the light source unit to form a plurality of secondary order light source images and a second array lens to focus a lens image of said first array lens to said display elements are used and the total number of any one or both lens cells of said first and second array lenses is set to almost 240 or more, an isolating section for isolating the light from said light source unit or array lens to the P-polarized light beam and S-polarized light beam and a converting section for converting the polarizing direction of any one of the P-polarized light beam and S-polarized light beam of the light emitted from said isolating section, whereby at least said first and second array lenses, said isolating section and said converting section are arranged in the manner that the respective optical axes thereof are almost matched with a line.

20. Imaging apparatus according to claim 19, wherein said isolating section is a polarized beam splitter and said converting section is a $\lambda/2$ phase difference plate.

21. Imaging apparatus to form an optical image depending on a video signal by irradiating the display elements with the light from the lighting optical system,

said lighting optical system comprising an array lens having the structure that a first array lens to condense the

light from the light source unit to form a plurality of secondary order light source images and a second array lens to focus a lens image of said first array lens to said display elements are used and the lens focal distance of lens cell of said first and second array lenses is set to almost 30 mm or less, an isolating section for isolating the light from said light source unit or array lens to the P-polarized light beam and S-polarized light beam and a converting section for converting the polarizing direction of any one of the P-polarized light beam and S-polarized light beam of the light emitted from said isolating section, whereby at least said first and second array lenses, said isolating section and said converting section are arranged in the manner that respective optical axes thereof are almost matched with a line.

22. Imaging apparatus according to claim 21, wherein said isolating section is a polarized beam splitter and said converting section is a $\lambda/2$ phase difference plate.

23. Imaging apparatus to form an optical image depending on a video signal by irradiating the display elements with the light from the lighting optical system,

said lighting optical system comprising an array lens having the structure that a first array lens to condense the light from the light source unit to form a plurality of secondary order light source images and a second array lens to focus a lens image of said first array lens to said display elements

are used and at least any one of the diagonal size, vertical size and lateral size of any one or both lens cells of the first and second array lenses is set to almost $1/(4.5 \text{ or more})$ for each corresponding size of said display elements, an isolating
5 section for isolating the light from said light source unit or array lens to the P-polarized light beam and S-polarized light beam and a converting section for converting the polarizing direction of any one of the P-polarized light beam and S-polarized light beam of the light emitted from said isolating
10 section, whereby at least said array lens, said isolating section and said converting section are arranged in the manner that respective optical axes thereof are almost matched with a line and an external size of the apparatus as a whole is set to the A4 file size or less.

15 24. Imaging apparatus to form an optical image depending on a video signal by irradiating the display elements with the light from the lighting optical system,

said lighting optical system comprising an array lens having the structure that a first array lens to condense the
20 light from the light source unit to form a plurality of secondary order light source images and a second array lens to focus a lens image of said first array lens to said display elements are used and the lens focal distance of lens cell of said first and second array lenses is set to almost 30 mm or less, an
25 isolating section for isolating the light from said light source

unit or array lens to the P-polarized light beam and S-polarized light beam and a converting section for converting the polarizing direction of any one of the P-polarized light beam and S-polarized light beam of the light emitted from said isolating section, whereby at least said first and second array lenses, said isolating section and said converting section are arranged in the manner that respective optical axes thereof are almost matched with a line and an external size of the apparatus as a whole is set to the A4 file size or less.

25. Optical unit to form an optical image depending on a video signal by irradiating the display elements with the light from the lighting optical system,

said lighting optical system comprising an array lens having the structure that a lens to condense the light from the light source unit to form a plurality of light source images is used and at least any one of the diagonal size, vertical size and lateral size of the lens cell is set to almost $1/(4.5 \text{ or more})$ for corresponding each size of said display elements.

26. Optical unit to form an optical image depending on a video signal by irradiating the display elements with the light from the lighting optical system,

said lighting optical system comprising an array lens having the structure that a lens to condense the light from the light source unit to form a plurality of light source images is used and a plurality of lens cells having the diagonal size

of almost 0.18 inch or less are arranged within a plane.

27. Optical unit to form an optical image depending on a video signal by irradiating the display elements with the light from the lighting optical system,

5 said lighting optical system comprising an array lens having the structure that a lens to condense the light from the light source unit to form a plurality of light source images is used and the total number of lens cells arranged in a plane is set to almost 240 or more.

10 28. Optical unit to form an optical image depending on a video signal by irradiating the display elements with the light from the lighting optical system,

 said lighting optical system comprising an array lens having the structure that a lens to condense the light from the
15 light source unit to form a plurality of light source images is used and a plurality of lens cells having the focal distance of almost 30 mm or less are arranged in a plane.

29. Optical unit to form an optical image depending on a video signal by irradiating the display elements with the light from
20 the lighting optical system,

 said lighting optical system comprising an array lens having the structure that a first array lens to condense the light from the light source unit to form a plurality of secondary order light source images and a second array lens to focus a lens image
25 of said first array lens to said display elements are used and

at least any one of the diagonal size, vertical size and lateral size of any one or both lens cells of the first and second array lenses is set to almost $1/(4.5 \text{ or more})$ for each corresponding size of said display elements, an isolating section for
5 isolating the light from said light source unit or array lens to the P-polarized light beam and S-polarized light beam and a converting section for converting the polarizing direction of any one of the P-polarized light beam and S-polarized light beam of the light emitted from said isolating section, whereby
10 at least said first and second array lenses, said isolating section and said converting section are arranged in the manner that respective optical axes thereof are almost matched with a line.

30. Optical unit to form an optical image depending on a video
15 signal by irradiating the display elements with the light from the lighting optical system,

said lighting optical system comprising an array lens having the structure that a first array lens to condense the light from the light source unit to form a plurality of secondary
20 order light source images and a second array lens to focus a lens image of said first array lens to said display elements are used and the diagonal size of the lens cell of any one or both first and second array lenses is set to almost 0.18 inch or less, a isolating section for isolating the light from said
25 light source unit or array lens to the P-polarized light beam

and S-polarized light beam and a converting section for converting the polarizing direction of any P-polarized light beam and S-polarized light beam of the light emitted from said isolating section, whereby at least said first and second array
5 lenses, said isolating section and said converting section are arranged in the manner that the respective optical axes thereof are almost matched with a line.

31. Optical unit to form an optical image depending on a video signal by irradiating the display elements with the light from
10 the lighting optical system,

said lighting optical system comprising an array lens having the structure that a first array lens to condense the light from the light source unit to form a plurality of secondary order light source images and a second array lens to focus a
15 lens image of said first array lens to said display elements are used and the total number of any one or both lens cells of said first and second array lenses is set to almost 240 or more, an isolating section for isolating the light from said light source unit or array lens to the P-polarized light beam and
20 S-polarized light beam and a converting section for converting the polarizing direction of any one of the P-polarized light beam and S-polarized light beam of the light emitted from said isolating section, whereby at least said first and second array lenses, said isolating section and said converting section are
25 arranged in the manner that the respective optical axes thereof

are almost matched with a line.

32. Optical unit to form an optical image depending on a video signal by irradiating the display elements with the light from the lighting optical system,

5 said lighting optical system comprising an array lens having the structure that a first array lens to condense the light from the light source unit to form a plurality of secondary order light source images and a second array lens to focus a lens image of said first array lens to said display elements
10 are used and the lens focal distance of lens cell of said first and second array lenses is set to almost 30 mm or less, an isolating section for isolating the light from said light source unit or array lens to the P-polarized light beam and S-polarized light beam and a converting section for converting the
15 polarizing direction of any one of the P-polarized light beam and S-polarized light beam of the light emitted from said isolating section, whereby at least said first and second array lenses, said isolating section and said converting section are arranged in the manner that respective optical axes thereof are
20 almost matched with a line.

33. Lighting optical system for an imaging apparatus to form an optical image depending on a video signal by irradiating the display elements with the light from the light source unit, comprising an array lens having the structure that a lens to
25 condense the light from said light source unit to form a plurality

of light source images is used and at least any one of the diagonal size, vertical size and lateral size of the lens cells arranged in a plane is set to almost $1/(4.5 \text{ or more})$ for corresponding each size of said display elements.

5 34. Lighting optical system for an imaging apparatus to form an optical image depending on a video signal by irradiating the display elements with the light from the light source unit, comprising an array lens having the structure that a lens to condense the light from said light source unit to form a plurality
10 of light source images is used and a plurality of lens cells having the diagonal size of 0.18 inch or less are arranged in a plane.

35. Lighting optical system for an imaging apparatus to form an optical image depending on a video signal by irradiating the
15 display elements with the light from the light source unit, comprising an array lens having the structure that a lens to condense the light from said light source unit to form a plurality of light source images is used and the lens cells in the total number of almost 240 or more are arranged in a plane.

20 36. Lighting optical system for an imaging apparatus to form an optical image depending on a video signal by irradiating the display elements with the light from the light source unit, comprising an array lens having the structure that a lens to condense the light from said light source unit to form a plurality
25 of light source images is used and a plurality of lens cells

having the focal distance of almost 30 mm or less are arranged in a plane.

37. Array lens having the structure that a plurality of lens cells having the diagonal size of almost 0.18 inch or less are arranged in a plane.

38. Array lens having the structure that lens cells in total number of about 240 or more are arranged in a plane.

39. Array lens having the structure that a plurality of lens cells having the focal distance of almost 30 mm or less are arranged in a plane.